Design of TiO_2-Surfactin hybrid systems with multifunctional properties

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Table S1. Sample codes and TiO_2:SS weight ratios of nanosols obtained by sol-gel synthesis process and relative powders obtained by SFD process.

Sample code		TiO_2:SS weight ratio
Nanosol	**Powder**	
TiO_2@SS_1:0.1_S	TiO_2@SS_1:0.1_S_SFD	10.0
TiO_2@SS_1:0.5_S	TiO_2@SS_1:0.5_S_SFD	2.0
TiO_2@SS_1:1_S	TiO_2@SS_1:1_S_SFD	1.0
TiO_2@SS_1:2_S	TiO_2@SS_1:2_S_SFD	0.5
TiO_2@SS_1:6_S	TiO_2@SS_1:6_S_SFD	0.17
TiO_2@SS_1:8_S	TiO_2@SS_1:8_S_SFD	0.13
TiO_2@TX_S	TiO_2@TX_S_SFD	16.7*

*TiO_2:Triton X weight ratio

Table S2. Sample codes and TiO_2:SS weight ratios of nanosols obtained by heterocoagulation process and relative powders obtained by SFD process.

Sample code		TiO_2:SS weight ratio
Nanosol sample	**Powder sample**	
TiO_2/SS_1:1_E	TiO_2/SS_1:1_E_SFD	1.0
TiO_2/SS_1:6_E	TiO_2/SS_1:6_E_SFD	0.17
TiO_2/SS_1:8_E	TiO_2/SS_1:8_E_SFD	0.13

The TiO_2 used to produce the heterocoagulated samples is TiO_2@TX of Table S1 (containing around 6 wt.% of Triton X)

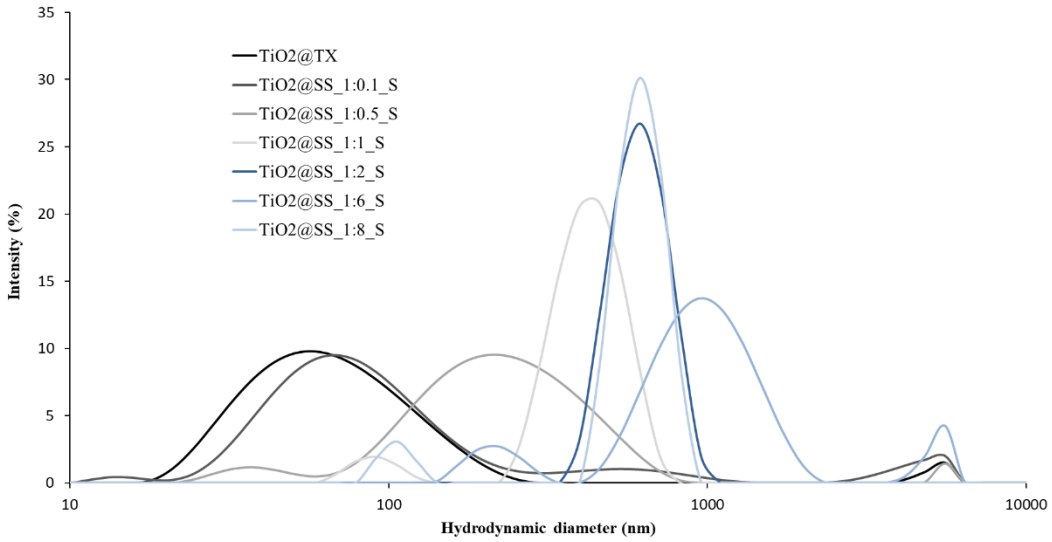

Figure S1. Particle size distribution of TiO_2@SS samples obtained by sol-gel synthesis method.

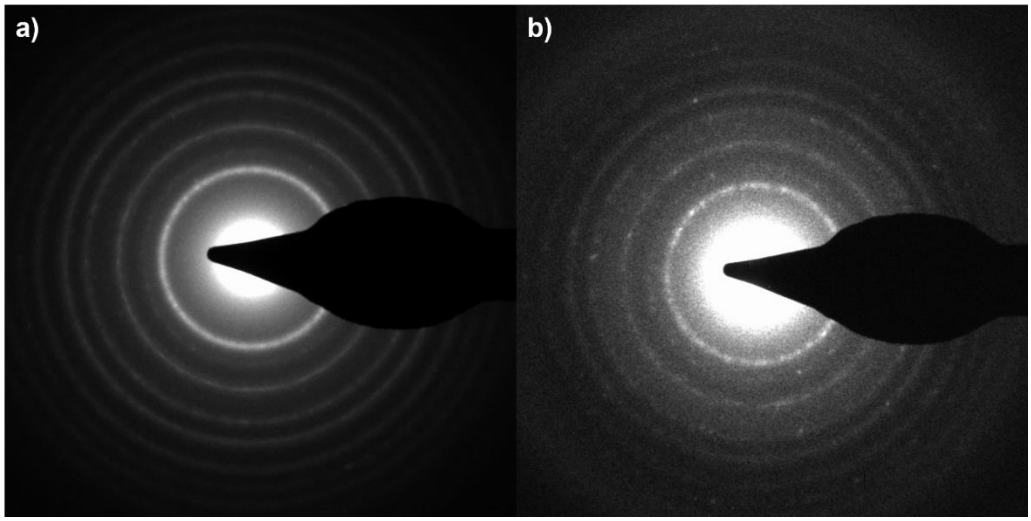

Figure S2. SAED patterns of a) TiO_2@SS_S_1:0.1 and b) TiO_2@SS_S_1:1 sample.

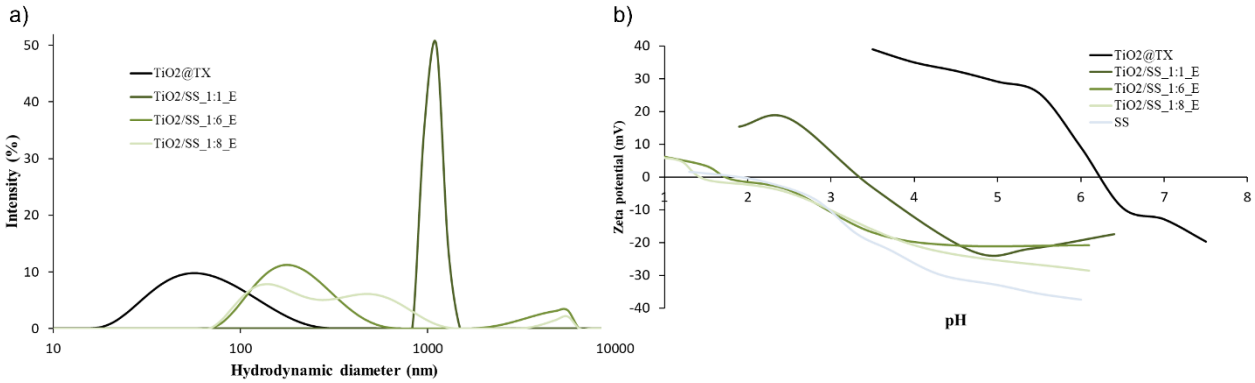

Figure S3. a) Particle size distribution and b) Zeta potential as a function of pH curves of TiO_2/SS_E samples obtained by heterocoagulation process.

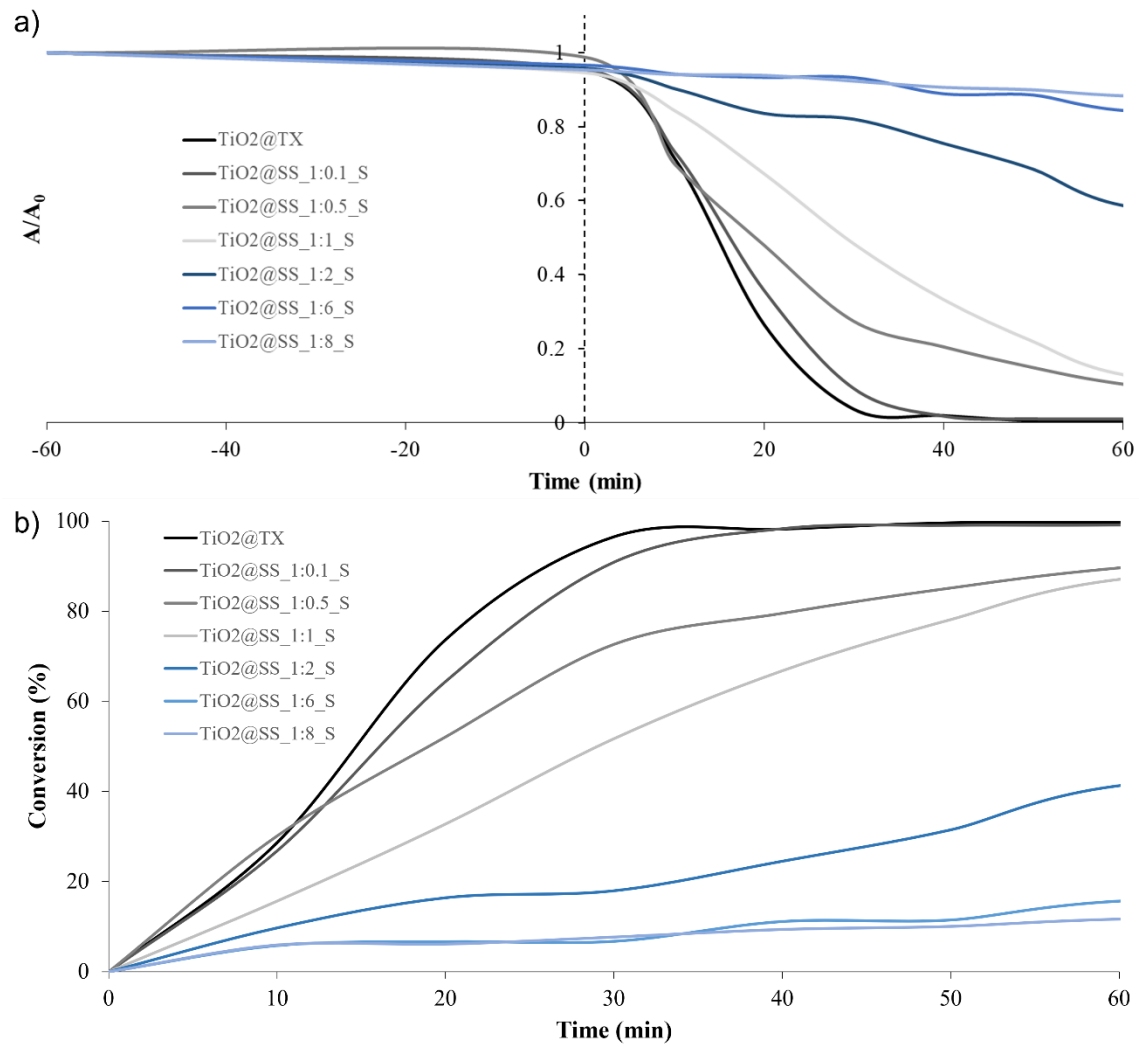

Figure S4. a) Trend of A/A_0 and b) Conversion (%) over time of TiO_2@SS_S samples obtained by sol-gel synthesis method.

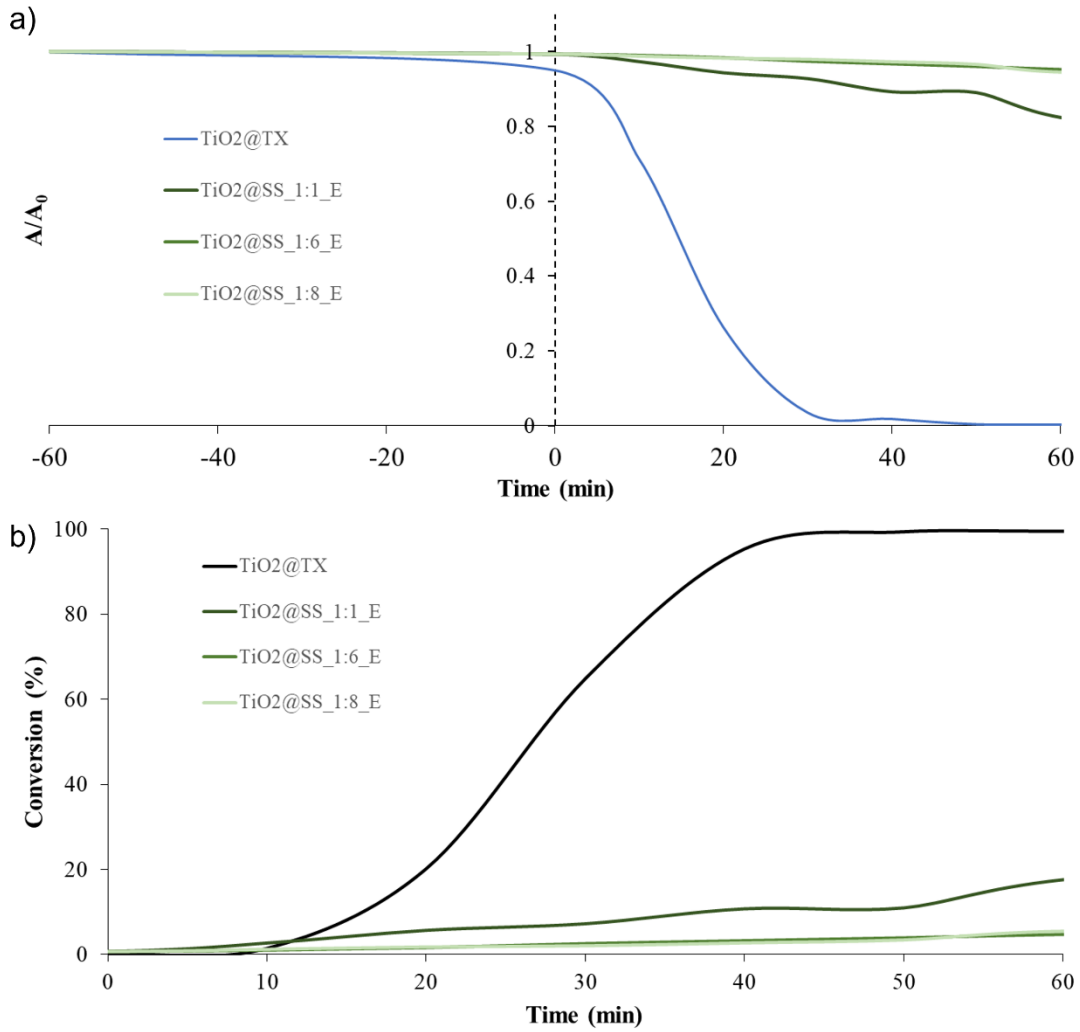

Figure S5. a) Trend of A/A_0 and b) Conversion (%) over time of TiO_2/SS_E samples obtained by heterocoagulation process.

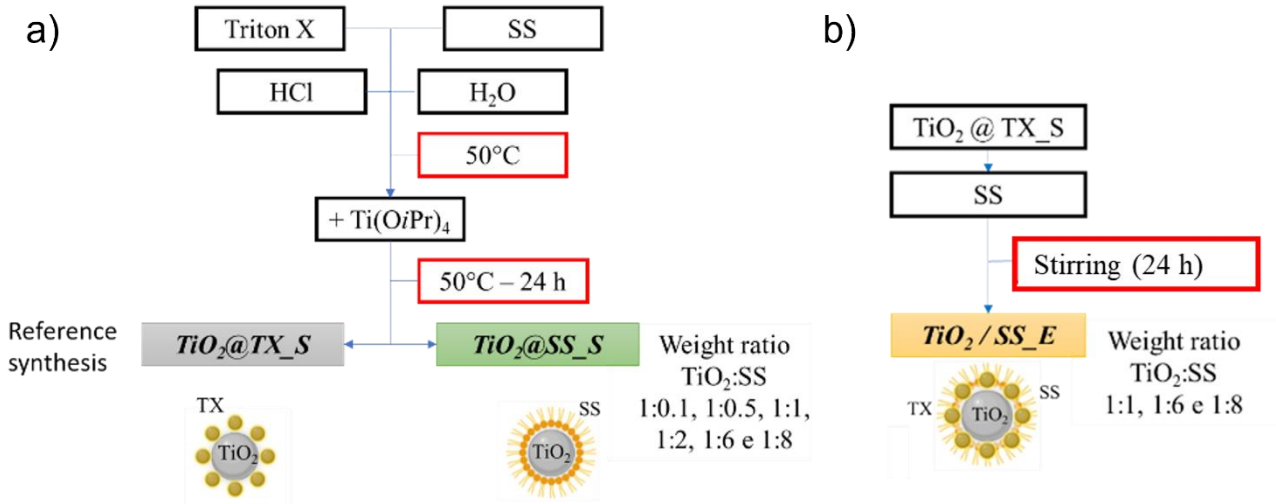

Figure S6. Scheme of a) sol-gel processes using Triton X (TX) and Sodium Surfactin (SS) as surfactant and b) heterocoagulation process.

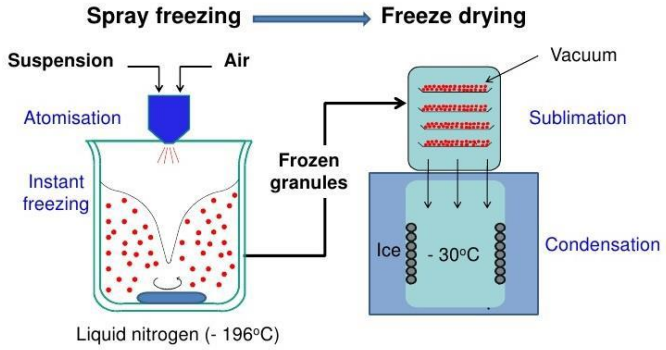

Figure S7. Schematisation of the spray-freeze-drying process.

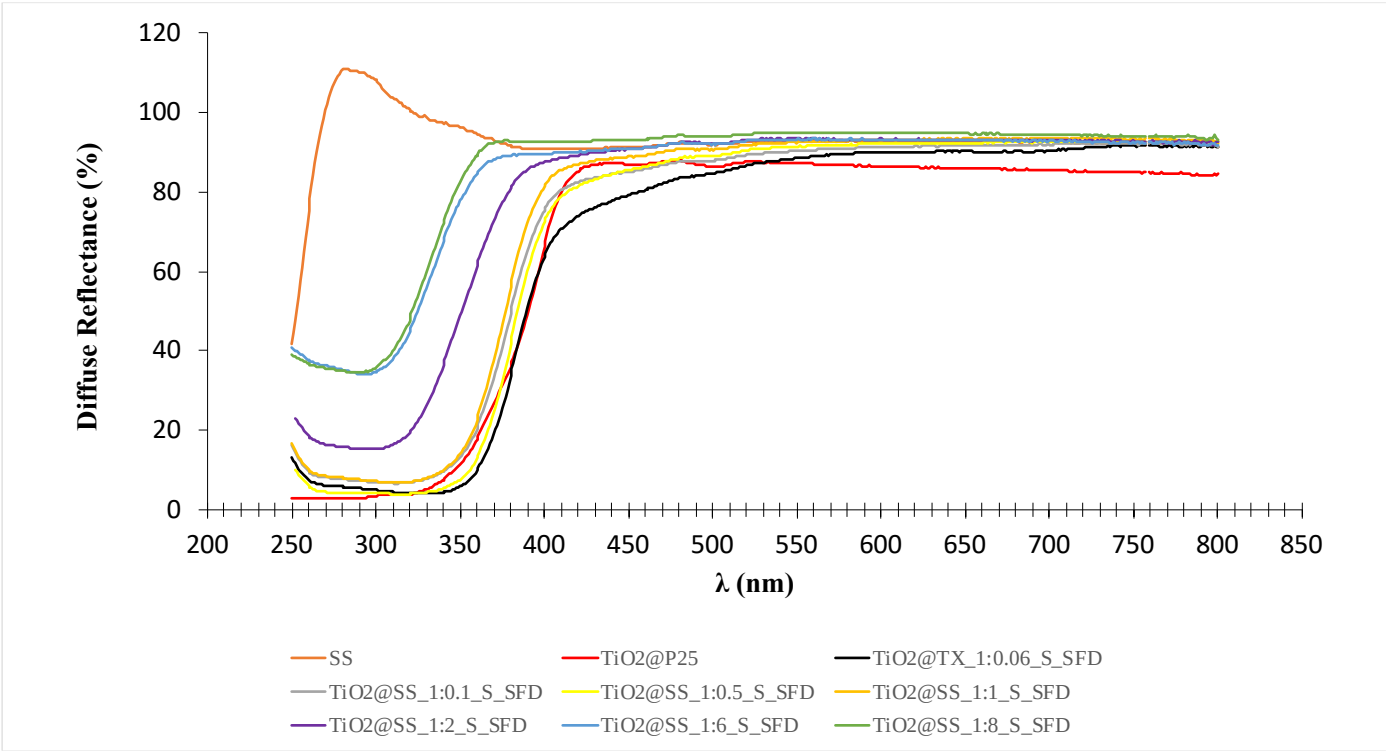

Figure S8. Diffuse reflectance over different wavelengths of TiO_2@SS_S samples.

Table S3. Adsorption properties derived by UV-Vis. analysis.

Powder sample code	Absorption range (nm)	Band gap energy (eV)
TiO_2@TX_SFD	350-450	3.14
TiO_2 P25*	350-420	3.19
TiO_2@SS_1:0.1_S_SFD	350-420	3.17
TiO_2@SS_1:0.5_S_SFD	350-420	3.18
TiO_2@SS_1:1_S_SFD	350-420	3.18
TiO_2@SS_1:2_S_SFD	300-380	3.33
TiO_2@SS_1:6_S_SFD	300-360	3.41
TiO_2@SS_1:8_S_SFD	300-360	3.41

*TiO_2 P25 (commercial powder sample from Degussa-Evonik)